LLNL Environmental Restoration Division Standard Operating Procedure	TITLE: Surface Water Sampling
APPROVAL Date _____ _____ Environmental Chemistry and Biology Group Leader	PREPARERS: S. Gregory and E. Walter REVIEWERS: E. Brandstetter*, R. Brown*, T. Carlsen, E. Christofferson*, V. Dibley, J. Duarte, B. Failor*, J. Greci, G. Howard, B. Hoppes*, and B. Ward*
APPROVAL Date _____ _____ Division Leader CONCURRENCE Date _____ _____ QA Implementation Coordinator	PROCEDURE NUMBER: ERD SOP-2.5 REVISION: 0 EFFECTIVE DATE: December 1, 1995 Page 1 of 8

*Operations and Regulatory Affairs Division

1.0 PURPOSE

To establish surface water collection techniques that ensure collection of representative samples.

2.0 APPLICABILITY

This procedure is applicable to the sampling of surface water at Site 300 and the Livermore Site. Surface water may include rainwater runoff, springs, and building discharges. Building discharges may include cooling tower discharges and/or effluent from septic systems.

3.0 REFERENCES

3.1 deVera, E. R., B. P. Simmons, N. D. Stephen, and D. L. Storm (n.d.), *Samplers and Sampling Procedures for Hazardous Waste Streams*, U.S. EPA, Washington, D.C. (EPA-600/2-80-018).

3.2 Ford, P. J., P. J. Tarina, and D. E. Seely (1984), *Characterization of Hazardous Waste Sites—A Methods Manual, 302. Vol. II of Available Sampling Methods*, Second Edition, U.S. EPA, Washington, D.C. (EPA/600/4-84/076).

3.3 Instrument Specialties Company (1980), *Instruction Manual, Model 2100 Wastewater Sampler.*

3.4 Korte, N., and D. Ealey (1983), *Procedures for Field Chemical Analyses of Water Samples*, U.S. Department of Energy, GJ/TMC-07, Technical Measurements Center, Grand Junction Project Office, Grand Junction, Colo.

3.5 Korte, N., and P. Kearl (1985), *Procedures for the Collection and Preservation of Groundwater and Surface Water Samples and for the Installation of Monitoring Well*s, Second Edition, U.S. Department of Energy, GJ/TMC-08, Technical Measurements Center, Grand Junction Projects Office, Grand Junction, Colo.

3.6 U.S. Department of the Interior publication (n.d.), *National Handbook of Recommended Methods for Water-Data Acquisition*, Washington, D.C.

3.7 U.S. EPA (1982), *Handbook for Sampling and Sample Preservation of Water and Wastewater*, Washington D.C. (EPA-600/4-82-029).

3.8 U.S. EPA (1983), *Methods for Chemical Analysis of Water and Wastes*, Washington, D.C. (EPA-600/4-79-020).

3.9 U.S. EPA (1984), *Test Methods for Evaluation of Solid Waste*, Second Edition, Washington, D.C. (EPA-SW-846).

4.0 DEFINITIONS

4.1 Volatile Organic Compounds (VOCs)

VOCs are a group of organic compounds characterized by their tendency to evaporate easily at room temperature. Some familiar substances containing VOCs are cleaning solvents, gasoline, paint thinners, and nail polish remover.

5.0 RESPONSIBILITIES

5.1 Division Leader

The Division Leader's responsibility is to ensure that all activities performed by ERD at the Livermore Site and Site 300 are performed safely and comply with all pertinent regulations and procedures, and provide the necessary equipment and resources to accomplish the tasks described in this procedure.

5.2 Field Personnel

The field personnel's responsibility is to properly perform Surface Water Sampling in compliance with all applicable regulations and procedures to ensure the samples and data provided are representative of actual conditions.

5.3 Sampling Coordinator (SC)

The SC's responsibilities are to ensure that the field personnel have been properly trained, they comply with all applicable regulations and procedures, and generate all applicable field sheets.

5.4 Study Area Leader (SAL)/Facility Task Leader (FTL)

The frequency of surface water sample collection is determined by the SAL or FTL in coordination with the SC.

6.0 PROCEDURES

6.1 Office Preparation

6.1.1 Prior to commencement of field activities, personnel shall review the appropriate Site Safety Plan, and all applicable SOPs and OSPs. Current copies of all appropriate documents shall be retained in the sample vehicle at all times.

6.1.2 Review Sampling Plan; schedule and coordinate schedules/actions with the SC.

6.1.3 Inventory all field equipment (Attachment A).

6.1.4 The number and type of sample containers needed for the sampling event should be obtained from the SC's supply (either from Building 833 at Site 300 or directly from the SC). The SC should keep a sufficient stock of sample containers on hand and should be alerted by field personnel when the supply should be replenished by the contract analytical laboratory (CAL). The type of analysis for which a sample is being collected determines the type of bottle, preservative, holding time, and filtering requirement. Refer to SOP 4.3, "Sample Containers and Preservation."

6.1.5 Check supplies (i.e., disposable 0.45 µ fiber filters, trip blanks, field blanks, plastic bags, etc.), and inform the SC when the supply level is low to avoid running out during an emergency.

6.1.6 Obtain appropriate data collection forms i.e., Chain-of-Custody (CoC) forms, Ground Water Sampling Logs (SOP 2.1, "Presample Purging of Wells," Attachment A), assigned field logbook, and any necessary shipping forms. Instructions for completing the logbook entries and field forms are provided in SOP 4.2, "Sampling Control and Documentation." Arrange for delivery of samples to the analytical laboratory through LLNL Shipping Section, or arrange for sample pickup and delivery to the laboratory by using the contract courier.

6.1.7 Field personnel should notify the SC when collecting interlaboratory collocated samples, so arrangements can be made with the CAL courier for sample pickup. If necessary, the Livermore Site Ground Water Monitoring SC will call out any interlaboratory collocated samples on a daily basis.

6.1.8 Field personnel will notify the SC needs when collecting samples with short holding times (i.e., hexavalent chromium, fecal and total coliform). The SC will inform the CAL that samples are being collected so that preparations for the analysis can be made by the laboratory.

6.1.9 The Administrative Escort Services must be given a 24-hour notice before work is scheduled in restricted areas. If appropriate, arrange access to sampling areas through Building Supervisors or the Control Point Operator per SOP 4.1, "General Instructions for Field Personnel."

6.2 Field Preparation

6.2.1 Assemble all appropriate sampling equipment (Attachment A) and load into field vehicle. Make sure that all sampling equipment is decontaminated according to SOP 4.5, "General Equipment Decontamination."

6.2.2 Locate surface waters to be sampled and determine the best sampling order. Always sample from least contaminated area to most contaminated area, if possible.

6.2.3 Fill out any initial information in the Document Control Logbook (SOP 4.2).

6.3 Operation

6.3.1 Sampling Location

Pick a sample location as close to the source as possible. In the case of building discharges (e.g., if the water is coming from a pipe or culvert), the samples should be collected directly from the pipe to reduce volatilization. In some cases (springs and some discharge locations), samples have to be collected directly from ground depressions.

6.3.2 Low Water-Yielding Springs

A. Manually dig a small depression in the saturated soil with a clean trowel or shovel.

B. Collect samples to be analyzed for VOCs as soon as sufficient water has filled the depression. Collect samples to be analyzed for other compounds as soon as sufficient water has filled the depression to fill remaining containers.

C. Continue sample collection by following steps 6.3.3 A through E.

6.3.3 Sufficient Water

If plenty of water is available, the procedures are as follows:

A. Collect samples in order of volatility, with samples to be analyzed for VOCs first. For small surface water bodies, collect samples directly into the container that will be sent to the laboratory. There can be no head space within the container (SOP 2.6, "Sampling for Volatile Organic Compounds").

B. Collect samples for other analyses directly into their appropriate container, or samples can be collected using a portable electric pump. However, the influent and effluent lines must be disposable tubing which is only to be used once per location. The use of a clean glass, stainless steel or Teflon vessel can also be utilized to transfer water into a specific sample container. Such "dip buckets" should be used to collect samples from large surface water bodies, to allow collection from near the center of the water body. A collection vessel should also be used if the sample container already contains any necessary preservative.

C. Secure caps tightly and attach an identification label to all containers. Instructions for filling out the identification label are in SOP 4.2. Fill in all data field sheets and log book and any additional information, as required.

D. Place samples into chilled cooler.

6.4 Post Field Operation

6.4.1 Before leaving the sampling location, cross check the samples collected with those requested by the SC, and/or note any discrepancies. To cross check refer to SOP 2.1, Attachment A.

6.4.2 Prior to sampling another site and to prevent cross contamination of equipment between locations, thoroughly decontaminate all equipment that is not dedicated according to SOP 4.5, "General Equipment Decontamination."

6.4.3 Complete the appropriate Ground Water Sampling Log and record sampling information in the designated Water Sampling Logbook (SOP 2.1 and SOP 4.2).

6.4.4 Verify that the CoC is appropriately completed per SOP 4.2. Indicate any special instructions in the Remarks Section of the CoC. Such instruction may include filtering and preserving the sample upon receipt. Also, for wells that are listed on the sampling plan as Clean Wells or for any well that is expected to be free of contamination write, "Verify any positive detections and call _____." The blank should be filled in with the appropriate QC Chemists name and phone number.

6.4.5 When appropriate, mark the sampling location and ID on a copy of the a site map. Mark the field location by driving a labeled stake wrapped with fluorescent marker tape adjacent to where the samples were collected. This stake is the reference point should the location need to be subsequently surveyed.

6.5 Office Post Operation

6.5.1 Inventory sampling equipment and supplies. Repair or replace all broken or damaged equipment.

6.5.2 Replace expendable items.

6.5.3 Deliver original CoC forms and logbooks to the SC. Deliver or fax CoC forms to the SC daily.

6.5.4 The SC will retain a copy of the original forms (CoC, ground water sampling log), and provide the originals to the Data Management Group (DMG) for final archive. The DMG will provide copies of the forms to the appropriate Operations and Regulatory Affairs Division Analyst, as necessary.

7.0 QA RECORDS

7.1 Field forms

7.2 Logbooks

7.3 Chain-of-Custody Forms

8.0 ATTACHMENTS

Attachment A—Equipment Checklist

Attachment A

Equipment Checklist

Equipment Checklist

_____ Air tight plastic bags
_____ Alconox (detergent)
_____ Appropriate SOPs, Site 300's Site Safety Plans, Livermore's Site Safety Plans, Sampling Plans, OSPs, etc.
_____ Brushes
_____ Deionized water
_____ Disposable towels
_____ Fluorescent marker tape
_____ Glass beaker (if necessary)
_____ Gloves
_____ Ice chest with double-bagged ice or Blue Ice
_____ Logbook
_____ Maps
_____ Packing material
_____ Paper towels
_____ Permanent ink markers
_____ Portable electric pump and disposable tubing
_____ Sample containers and appropriate preservative when necessary
_____ Shovel
_____ Sledge hammer
_____ Stakes
_____ Teflon grab sampler (dip bucket)
_____ Trash bags
_____ Trowel